

REMARKS

The Official Action mailed July 3, 2003, has been received and its contents carefully noted. This response is filed within three months of the mailing date of the Official Action and therefore is believed to be timely without extension of time. Accordingly, the Applicant respectfully submits that this response is being timely filed.

The Applicant notes with appreciation the consideration of the Information Disclosure Statement filed on January 24, 2002.

With respect to the Information Disclosure Statement filed on March 19, 2002, (and received by OIPE on March 28, 2002), the Official Action asserts that "the case did not contain a 1449 form listing the references" (page 2, Paper No. 8). Apparently, the Form PTO-1449 was lost after it was received by OIPE. The Applicant respectfully submits that the IDS and Form PTO-1449 were properly filed on March 19, 2002, as evidenced by the attached copy of the receipt card which was date stamped by OIPE on March 28, 2002, and which indicates receipt of the "Information Disclosure Statement with Certificate of Mailing" and "Form PTO-1449 (with 1 reference)." The Applicant has attached a copy of the IDS and Form PTO-1449. The Applicant respectfully requests that the Examiner provide an initialed copy of the Form PTO-1449 evidencing consideration of the IDS filed March 19, 2002.

Claims 1-36 are pending in the present application, of which claims 1-3, 23 and 28-30 are independent. Claims 23 and 28 have been amended to correct minor typographical errors. For the reasons set forth in detail below, all claims are believed to be in condition for allowance. Favorable reconsideration is requested.

The Official Action objects to claims 23 and 28, noting that "channel oxide" should be changed to "chemical oxide." In response, claims 23 and 28 have been amended in conformance with the Examiner's suggestion. The amendments are merely clarifying in nature, and should not in any way affect the scope of protection afforded the claims for infringement purposes, particularly under the Doctrine of Equivalents.

Accordingly, reconsideration and withdrawal of the objection are in order and respectfully requested.

The Official Action rejects claims 1-36 as obvious based on the combination of U.S. Patent Application Publication No. 2002/0098635 to Zhang et al. and U.S. Patent No. 5,966,596 to Ohtani et al. The Applicants respectfully traverse the rejection because the Official Action has not made a *prima facie* case of obviousness.

As stated in MPEP §§ 2142-2143.01, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

The present invention solves a problem that a semiconductor film is etched when a doping process such as channel doping is carried out. The Applicant has found that the problem is caused by hydrogen ions, and that the problem is solved either by forming a chemical oxide film on a surface of a semiconductor film comprising silicon as a pretreatment for a channel doping process (claims 1, 23 and 28); by terminating dangling bonds on a surface of a semiconductor film comprising silicon with oxygen as

a pretreatment for a channel doping process (claims 2 and 29); or by terminating dangling bonds on a surface of a semiconductor film comprising silicon with an element to be bonded with bonding energy higher than that of Si-H bonds as a pretreatment for a channel doping process (claims 3, 30) (see, e.g., the experiment shown at page 4, line 4, through page 6, line 20, and in Fig. 1 of the specification).

There is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify Zhang and Ohtani or to combine reference teachings to achieve the claimed invention. The Official Action concedes that Zhang does not disclose that "the method of forming a chemical oxide film is formed by treatment with ozone water, hydrogen peroxide or ozone treatment through ultraviolet irradiation in an atmosphere containing oxygen" (page 3, Paper No. 8). The Official Action relies on Ohtani to allegedly teach these features of the present invention (pages 3-4, Id.). The Official Action asserts that "[it] would have been obvious to one of ordinary skill in the art at the time of invention was made to form the oxide layer of Zhang et al. by the method of Ohtani et al. since it is a known alternative method of forming an oxide and as Ohtani et al. teaches this method improves the surface characteristics of the underlying film" (page 4, Id.). The Applicants respectfully disagree.

It appears that Ohtani discloses a thin oxide film (not shown) over an amorphous silicon film 13, which is formed "by ultraviolet radiation within an oxygen ambient or immersing the substrate in ozone water or hydrogen peroxide water" (column 2, lines 39-47 and Fig. 6A). However, in Ohtani, the "thin film oxide improves the surface characteristics of the amorphous silicon film 13 and thus the amorphous silicon film no longer repels water" (column 2, lines 41-42). As such, the effect of the Ohtani thin oxide film is different from the effect of the pretreatment step of the present invention. Furthermore, the effect of the Ohtani thin oxide film is different from the effect of the Zhang oxide film, which appears to be a protective film for a doping step. It is not clear why one of ordinary skill in the art would look to Ohtani and be motivated to change the

surface characteristics of the amorphous silicon film of Zhang. Even assuming motivation could be found, the Official Action has not given any indication that one with ordinary skill in the art at the time of the invention would have had a reasonable expectation of success when combining Zhang and Ohtani. Specifically, it is not clear that the thin oxide film of Ohtani would successfully work in lieu of the protective film in Zhang. As such, the Applicant respectfully submits that it would not have been obvious to one of ordinary skill in the art at the time of the invention to combine Zhang and Ohtani.

The Official Action also concedes that "Ohtani et al. does not explicitly state that the pretreatment terminates dangling bonds on a surface of the semiconductor film with oxygen" (page 4, Paper No. 8). The Official Action then relies on the Applicant's own disclosure for the teaching that "the termination of bonds ... occur with oxygen," notes that the thin oxide film of Ohtani may be formed in an oxygen ambient, and concludes that the thin oxide film of Ohtani "inherently terminates dangling bonds on the surface of the semiconductor film with oxygen" (*Id.*). The Applicants respectfully traverse the finding of inherency, because the Official Action has not provided a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the Ohtani reference. MPEP § 2112 makes clear that

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) . . . "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) "In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art."

Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original)

Nothing in Ohtani teaches or suggests using the thin oxide film of Ohtani as a pretreatment for a channel doping process, much less that the thin oxide film of Ohtani terminates dangling bonds on a surface of a semiconductor film. Ohtani is silent on the subject of dangling bonds on a surface of the semiconductor film and does not relate the formation of the thin oxide film to a pretreatment for channel doping. It appears the Official Action relies on hindsight for a basis in fact and/or technical reasoning and not on the teachings of the Ohtani reference. As such, the Applicant further submits that there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify Zhang and Ohtani or to combine reference teachings to achieve the claimed invention.

The Applicants further contend that even assuming, *arguendo*, that the combination of Zhang and Ohtani is proper, there is a lack of suggestion as to why a skilled artisan would use the proposed modifications to achieve the unobvious advantages first recognized by the Applicants. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.

In the present application, it is respectfully submitted that the prior art of record, alone or in combination, does not expressly or impliedly suggest the claimed invention and the Official Action has not presented a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.

For the reasons stated above, the Official Action has not formed a proper *prima facie* case of obviousness. Accordingly, reconsideration and withdrawal of the rejection under 35 U.S.C. § 103(a) are in order and respectfully requested.

Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact the Applicant's undersigned attorney at the telephone number listed below.

Respectfully submitted,


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